Power Sector Reforms in Nigeria: Challenges and the Way Forward

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Abstract
It is almost a decade now since the Electric Power Sector Reforms Bill was signed into law. The law, among other objectives, is to ensure a system of electricity generation, transmission, distribution and marketing that is efficient, safe, affordable and cost-effective throughout the industry. It appears, however, that the effectiveness of the reforms in transforming the sector has remained uncertain. The major objective of this paper therefore, is to examine the challenges facing the power sector reforms in Nigeria by employing a purely descriptive method and to suggest the way forward. The focus of exposition is on the appropriate energy mix in generation, workable tariffs and supply gap in the electricity generation within the context of power reforms. The paper offers a number of suggestions that can move the power sector forward in Nigeria.

Introduction

The power sector has witnessed a profound growth in the last few decades across the globe owing largely to technological innovations and changes in economic thinking. A manifest feature of this growth is the deregulation of the sub-sector, which used to be a monopolistic and state owned parastatal to a more vibrant oligopolistic market structure. According to Bacon (1999) the pace and magnitude of the trend has been remarkable and, by the end of 1990, the majority of Organisation for Economic Cooperation and Development (OECD) countries and over 70 developing and transition countries had embarked on some initiatives towards reforming their electricity industry, thus reflecting an appreciable tempo and enormity.

The motivation for electricity reform differs considerably among developed and developing countries. In developed countries, the principal aim has been to improve the economic and financial performance of the sub-sector; while in developing countries and transition countries, macroeconomic conditions have played a critical role. This is obvious as many governments are no longer willing or able to support the burden of subsidies, low service quality, non-collection rates, higher network losses and poor service coverage. Following the implementation of the Structural Adjustment Programme (SAP) in 1986, which has commercialization and privatization of public utilities as one of its cardinal goals, the Federal Government of Nigeria has at various times put in place a number of measures to revamp the power sector in Nigeria. In 1988, for instance, the National Electric Power Authority was commercialized, with that the organization was able to review its tariffs upward.

As part of the restructuring, former President Olusegun Obasanjo signed into law the Electric Power Sector Reforms Act in 2005. It is about a decade now since the bill was signed into law. This is therefore a pertinent period to evaluate the efficacy of the reforms. To this end, the relevant question is: has the passing of the bill into law ensured more efficient and regular supply of electricity at minimum tariffs? This question among others, has spurred the need to examine the challenges and the way forward for power sector reforms in Nigeria in this

study. Specifically, attention has to be focused on the appropriate energy mix in generation, workable tariffs and the supply gap in the electricity generation in Nigeria under the reform. In fact, the experiences of countries like Italy 2003; California (US) 2001; Auckland, (New Zealand) 1998, Chile 1998-1999 show the urgency for the diagnostic examination of the electricity reforms which this paper focuses on. As Newbrey (2002, 5) quoting Watts (2001) has admitted, "*it is clear that deregulation is a high risk choice. Those jurisdictions that have not yet deregulated electricity generation need to think long and hard before they go ahead. Those that have done so need to figure out how to minimize the downside potential of the journey on which they have embarked".* Conceivably, an attempt to shed light on these issues raised by Watts will be quite fascinating and illuminating for necessary policy alternatives and fine-tuning in Nigeria.

The rest of the paper is organized as follows: The focus of exposition in section two is on some stylized facts concerning the electricity sector and the electric power sector reform Act 2005 in Nigeria. This embraces a discussion of the industry plus some salient features of the reform. In section three, a review of the international experience in the sector is presented from which Nigeria can take a cue. Section four is on the current challenges and the suggested way forward of the reform. Essentially, the paper discusses such issues as the need for an appropriate energy mix in generation, workable tariffs and the supply gap in the industry, at least in the generation segment among others. The conclusion and recommendations are contained in section five.

Some Stylized Facts about the Electricity Sector and the Electric Power Sector Reform Act (EPSRA) 2005 in Nigeria.

The (EPSRA) 2005 is the latest legislation in the array of legislations on the electricity industry in Nigeria. It would be recalled that the Nigerian electricity industry began towards the end of the 19th century, when the first generating plant was installed in Lagos in 1898 by the colonial government. The Public Works Department (PWD) was in charge of its management. In 1950, the Federal Government passed the Electricity Corporation of Nigeria Ordinance No. 15 of 1950. Several other legislations had been enacted including the Niger Dam Authority (NDA) Act of Parliament in 1962 and the Degree No 4 of June 7 1972, by which the National Electric Power Authority (NEPA) was established. NEPA was mandated to maintain an efficient, coordinated and economic system of electricity supply to all parts of Nigeria. The law made NEPA the sole body responsible for the generation, transmission, distribution and marketing of electricity. A monopolistic status was thus conferred on NEPA.

NEPA as a state-owned establishment remained inefficient in service delivery, innovation and management. Following the implementation of the Structural Adjustment Programme (SAP) in 1986, the Federal Government put in place several measures to revamp the sub-sector. In 1988, NEPA was commercialized, which enabled the organization to review its tariffs upward. As part of the restructuring effort, former President Olusegun Obasanjo signed into law the Electric Power Sector Reform Bill 2005, which broke the monopoly of NEPA. The specific objectives of the reform are stated as follows:

- To ensure a system of generation, transmission, distribution and marketing that is efficient, safe, affordable and cost effective throughout the industry. In the long run, to provide access to electricity, although not necessarily through grid;
- To ensure that the electricity supply is made more reliable so as to effectively support the socioeconomic development of the country;

- To ensure that the power sector attracts private investors both from within and outside the country;
- To ensure minimum adverse environmental impact; and
- To ensure a leadership role for Nigeria in the development of the proposed West African Power Pool.

In order to actualize the above lofty objectives, the Electric Power Reform Act 2005 adopted the wholesale competition model as opposed to the single-buyer model or retail competition. In this arrangement, the distribution companies buy power directly from generators while the transmission company acts solely as the electricity transport and dispatch company. The adoption of this model therefore paved way for the unbundling of NEPA into 18 companies, made up of 6 generators, 11 distributors and one transmission company. In addition, the Act made provision for the reform in phases. First, a 100 per cent state-owned Initial Holding Company (IHC) was created and vested with the assets and liabilities of NEPA. This company co-existed with Independent Power Producers (IPPs), of which NEPA signed power purchase agreements. The National Electricity Regulatory Commission (NERC) was also created at that stage. The creation of this independent regulator is fundamental to the reform programme and the objective of attracting private sector investment. Successor companies were also incorporated into this phase for the purpose of assuming the assets and liabilities of the IHC. Furthermore, these companies have powers to carry out the functions relating to the generation, transmission, trading, distribution and bulk supply as well as resale of electricity. Cross-ownership is strictly prohibited. The federal government would, initially, hold the shares in the successor companies and these companies would gradually be privatized. A special purpose entity would also be created for the purpose of procuring electricity from successor generation companies as well as the IPPs.

In the second medium-term phase, the privatization of the successor generation and distribution companies would have largely been completed, while the successor transmission/dispatch company would be left under the control of the government. Consequently, the 11 distribution companies and four generating companies were privatized while the federal government also contracted out the management of the transmission company to Manitoba Transmission Company.

The final long-term phase would involve the establishment of a solely competitive market, characterized by economic pricing of electricity that would allow for recovering full cost of supply electricity. Subsequently, the NERC adopted a multi-year order tariff in 2008 in order to ensure reasonable electricity tariff to the end users and fair returns on investment to generation, transmission and distribution companies. The matters arising from the implementation of the reforms after almost ten years constitute the focus of exposition in this paper.

Literature Review

Indisputably, the United States is one of the foremost countries in the world that embraced competition in their electricity sub-sectors with remarkable success. However, this observation should be qualified because of the initial experience in California. California originally reformed and liberalized its electricity market because of the dissatisfaction over high consumer prices. Unfortunately, average wholesale prices in 2000 after liberalization were more than three times those of 1999. The year 2001 witnessed several blackouts with consequent adverse effect on companies, many of which folded up, recording a high rate of bankruptcy in that year.

As observed by Joskow (2001), California's experience has shown that poor market design coupled with inappropriate regulatory and political intervention can rapidly produce extremely unsatisfactory outcomes when capacity is tight, particularly if the shortages are unexpected. This observation seems to corroborate Joskow's (1998) assertion that the success of infrastructure sector reform, in particular, electric power, partly depends on the creation of effective regulatory institutions. He therefore submitted that issues to be addressed in designing the institutions would include, establishing regulatory goals and deciding on the structure and organization of regulatory agency. It must be stressed at this point that the issue of institutional setting is crucial in both developed and developing countries in the light of the recent development in California.

Similarly, Joskow (2007) examined the lessons learned from electricity sector liberalization over the past few decades. The attribute of reforms model that have spurned good performance are identified, drawing on empirical analysis of market structure, behavior and performance in many countries. Essentially, the author discussed wholesale and retail market competition and network regulation performance evidence. He concluded the paper by examining the technical, economic and political challenges to improving the efficiency of what continue to be partial liberalization programmes in many countries.

Midttun (1996) presented a comparative study of British and Norwegian electricity sector following the deregulation their electricity industry. Britain and Norway have been European pioneers to embrace competition in their electricity industries, but they have done so in very different ways. Both countries created a system in which the potentially competitive activities, generation and supply to final consumers were opened up to competitive market forces. However, Britain liberalized by privatization leaving generation largely concentrated in a few companies. Norway, on the other hand, maintained a dominant public ownership but sought to create a competitive environment through a decentralized production structure.

The British 'capitalist' and Norwegian 'structuralist' approaches both exhibited clear market oriented features, but with the dynamics placed respectively on the ownership side and on decentralized competition. This study has raised a salient question of ownership and control of public enterprises between the private and public. While Britain favours the transfer of ownership from government to private sector, Norway embraces public ownership with competition. The danger of outright transfer of ownership from government to private sector is obvious in the context of developing countries like Nigeria. Provided the emergent ownership structure is carefully designed, privatization may lead to the transfer of government monopoly to private monopoly, which will be counter-productive. Economic history has shown that as there are efficient private companies, there are equally efficient public companies and vice-versa. Hence, the issue of ownership is incidental to operational performance. What is crucial therefore is the enabling environment that will generate healthy business competition on a level playing field for the operators of the enterprises, public or private. This argument, has been extensively discussed elsewhere (Isola, 2002). Aside from Norway, Bye and Hope (2008) admitted that other Nordic countries including, Sweden and Demark have had a reasonably successful reform experience devoid of full privatization. However, the Nordic Competition Authorities (2007) maintained that the Nordic model still must grapple with the challenges of attracting investment in new generating capacity based on market incentives rather than on direct or indirect government interventions in the form of subsidies.

From the foregoing, the strengths and weaknesses of the approaches adopted by Britain and Norway would no doubt be informative to developing countries that are in the threshold of liberalizing their electricity sub-sector. It must be noted that the UK experience with restructuring of generation and mitigating possible market power has demonstrated the complexity and challenges involved in introducing competition into the sector. Green and Newbery (1992) showed that the initial structure based on only two unequal competing generators was inefficient and that two equal competing firms would be more effective. Wolfram (1999) showed that although prices under oligopoly appeared to have been above marginal costs, regulatory constraints, threat of new entry and financial constraints may have produced lower prices than the theory would suggest. The experience of the UK with respect to the determination of the optimum market structure might therefore be relevant to Nigeria at this stage of her restructuring effort.

The power sector in many Latin American countries has been deregulated with an increasing level of private ownership and management. Pollitt (2004) and Littlechild (2013) noted that the performance of the electricity sector in Chile after the reform was incredible, as investment in generation and transmission grew; average industrial and residential prices for electricity fell; and there was expansion in rural electrification and improvement in the quality of service delivery among others. The spill-over effects of the improvements were noticeable in the growth of the GDP during the process of privatization and a decline in inflation. However, the development of the power sector reform in Chile and the experience of Colombia and Peru is a continuous exercise. Overview of the experiences of other countries were presented by Woof et al (2010); Chernonko (2013); Sen and Jamash (2013); Ma (2011) and Dorman (2014). The experiences of all these countries will no doubt be of interest to our study.

A number of issues are highlighted in the review of literature, form which Nigeria can learn lessons in her restructuring efforts. First, the need to model the optimum market structure from the onset. A modelling of the market structure will provide an insight into the behaviour of the operators in the industry, as well as the quantity of electricity to be generated. In addition, the model will take cognizance of the need for appropriate energy mix in generation. Second, there is the need to pay attention to issues concerning conduct regulations, which include the establishment of average tariffs and quality of service to be provided and penalties that should be applied when quality levels are not met. Perhaps the most important lesson is that models that appear to work well in some circumstances and place may not be easily transferred to countries facing different circumstances.

The uniqueness of this current study lies in the fact that it examines matters arising from the implementation of Power Sector Reform Act 2005, within the first decade of implementing the Act for necessary policy interventions. It is an attempt to evaluate how to minimize the downside potential of the reform journey embarked upon in the last 10 years.

Challenges and the Way Forward

Nearly a decade after the enactment of the Power Sector reforms in Nigeria, one of the challenges still confronting the country is the irregular power supply, apart from insecurity and the threat to life and property. In other words, there has been no spectacular change in terms of the operational performance between the pre- and post-power sector reforms in Nigeria. The problem posed by inadequate and unreliable power supply is that the production frontier of the economy has been unnecessarily curtailed. The industrial sector, the artisans and households are adversely affected by the erratic power supply. In an attempt to

circumvent the problem of unreliable power supply, producers have invested in in-house captive power generation to supplement power supply from the national grid. However, the attendant challenges have been misallocation of scarce resources, high cost of production and low productivity. Since inadequate and erratic power supply reduces the national production frontier, the level of employment is reduced and national output is also emaciated. These are serious challenges that can be addressed by fixing the power sector of the economy to ensure an inclusive growth in Nigeria.

Tied to the problem of erratic power supply is the issue of having a workable electricity tariffs. Although, this has been a recurring challenge in Nigeria even before the implementation of the power sector reforms. Ayodele (1999) admitted that the electricity tariff structure in Nigeria has always been below the marginal cost. In order to fix this challenge, in 1988 the National Electric Power Authority (NEPA) was partially commercialized, supported by an upward review of tariffs. Since then, there have been several upward reviews in 2000 and 2002. Yet, when compared with tariffs in other countries in Africa, electricity tariff in Nigeria is not cost-reflective. As part of the restructuring effort of the power sector, the Electric Power Sector Act 2005 was enacted, which adopted a Multi-Year Tariffs Order (MYTO) to estimate end-user tariff in Nigeria. To date, MYTO has been reviewed several times since inception in 2008. Nevertheless, the issue of adopting a workable tariff structure in Nigeria is still elusive as consumers are dissatisfied with the exorbitant bills and poor service delivery. The recent amendment of the MYTO (2015) representing a 45 per cent hike in electricity tariff as shown in Table 1 has generated heated controversy between the government and stakeholders. The government on its part argued that the old tariff was not sustainable as it would not attract the required investment in the sector. To register their grievances, the stakeholders, including members of the organized labor engaged in mass rallies across the country and issued a two-week ultimatum to government to revisit the decision. This is a major challenge confronting the power sector reform in Nigeria. However, the federal government has ever since suspended the implementation of the new tariffs, which appears to be a policy reversal capable of discouraging genuine private investors into the sector. Perhaps, the issue is not the high tariffs but the quality of service delivery as most consumers appear ready to pay for the services rendered. The crucial task to unravel is the determination of willingness to pay for good quality and uninterrupted power supply among the people of Nigeria.

Table 1: New Electricity Tariffs for Residential Consumers

DISCOS	2015 (R2)	2016 (R2)	2017 (R2)	2018 (R2)	2019 (R2)
Abuja	14.70	24.30	24.30	24.03	20.40
Benin- single phase	14.82	24.08	31.27	31.26	30.98
- Three phase	14.82	24.45	34.40	34.40	34.08
Enugu-single phase	16.44	27.13	30.93	31.00	22.91
Three phase	16.44	27.13	34.36	34.36	25.40
Ibadan	16.11	23.09	24.97	25.71	25.76
Jos	16.75	26.93	29.81	30.93	32.05
Kaduna-single phase	17.00	26.37	27.40	28.75	20.45
Three phase	17.00	28.05	32.33	33.93	24.13
Kano – single phase	16.01	20.26	22.50	25.46	24.82
- Three phase	16.01	26.41	29.61	33.50	32.65

Ikeja – single phase	13.21	21.30	21.10	18.94	18.45
- Three phase	13.21	21.80	21.73	20.59	20.59
Port Harcourt	15.09	24.91	30.23	31.78	31.93
Eko – single phase	15.63	24.00	22.34	20.47	20.06
- Three phase	25.63	25.79	28.39	26.02	25.49
Yola – single phase	15.00	23.25	25.73	26.57	27.82
- Three phase	15.00	24.75	28.17	29.02	30.46

Source: NERC (2016)

The quantity of electricity generated in Nigeria is still very meager while the quality of the service delivery is very poor. Despite the private sector's participation in the business of power sector, the general consensus of the people is that power supply has not significantly improved. A substantial supply gap for electricity generation exists in Nigeria. Currently, electricity generation in Nigeria is around 3000MW, whereas, the projected electricity demand is put at 31,240MW by the year 2015 (ECN, 2014). This shows the huge gap between demand and supply of electricity in Nigeria. For the purposes of comparison, South Africa generates 40,000MW for a population of 50million people; Brazil generates 100,000MW for a population of 192 million people; USA generates 700,000MW for a population of 308 million while in Nigeria with a population of over 150 million people, electricity generation has been oscillating within the range of 1,700MW and 4,700MW since the inception of the power sector reforms in Nigeria. This perhaps, must have explained the high cost of generation of electricity in Nigeria and consequently, the exorbitant tariffs, which the consumers rejected.

Another challenge is the inappropriate energy mix in the generation of electricity in Nigeria. To a large extent, Nigeria relies on thermal fuel to generate electricity and to a less extent on hydro. It is even worrisome to observe that almost all the generation expansion programmes of the Independent Power Producers (IPPs) along with the federal government through the National Integrated Power Projects (NIPPs) are thermal-gas based, except the Mambilla hydro station. According to Kupolokun (2006), the federal government promised to complete 22 gas fired plants by 2010 to improve the nation's electricity generating capacity. The constant vandalisation of gas pipelines in the Niger Delta region, with the attendant shortage of gas supply to generate electricity has made the need to diversify very germane at this material time. Ibiyemi (2006) submitted that the generation of power supply in Nigeria suffered a major setback in the year 2006 as a result of disruption of gas supplies to the Egbin station from the Niger Delta. The situation has remained unabated as the power outages across the country presently are partly attributable to vandalisation of pipelines that supply gas to the power plants. This is a pointer to the various Independent Power Producers that aside from gas based thermal plants; other sources like coal, solar, wind and hydro should be used as primary sources of generating electricity in Nigeria. The experience of Ontario in Canada, which relied much on hydro, has confirmed that weather condition plays a significant role in driving prices higher during summer. Reliance on hydro may, therefore, instigate importation of electricity at higher cost. This scenario has empirically demonstrated that reliance on a single technology is not the best option even in the advanced economy. The problem of over- reliance on a single technology with the attendant energy crisis has compelled Ghana, in the recent times, to explore alternative sources of generating electricity from solar energy and biogas to support the Akosombo dam (Dike, 2006).

Arguably, a pile of government and private capital has been attracted to build new power plants through the various IPPs and NIPPs. The rest of the supply chain is a mess. According to Labo (2010), the transmission capacity to wheel electricity generated to the load centres is less than 6,000MW while the figure is put at 7,760.5 in the post NIPP transmission expansion. Apart from its limited capacity, the coverage is about 40 per cent. The age distribution of the major equipment of the sector revealed that almost 80 per cent of the equipment were acquired more than 20 years ago, reflecting the dilapidated structure and hence an average transmission loss of 8.5 per cent as shown in Table 2. Besides, most of the discos inherited dilapidated equipment. Consequently, the poor conditions of transformers and electricity lines have hindered adequate supply.

Table 2: Energy sources in Nigeria

Energy type	Estimated reserves
Wave and tidal energy	150,000tj/(16.6 x 106 toe/year
Crude oil	36 billion barrels
Biomass	144 million tons/year
Hydro	14,750 MW
Natural gas	185 trillion cubic feet
Solar radiation	3.5-7.0 kmh/m^2/day
Coal	2.75 billion metric tons
Wind energy	2.0-4.0 m/s

Another major challenge confronting the power sector reforms in Nigeria is the constant vandalisation of gas pipelines. Some of the pipelines, which channel energy to thermal plants that supply electricity, are buried beneath deep water. But unlike petroleum pipelines ruptured for scooping fuel to make easy money, gas pipeline vandalism offers no such immediate gain. A dispassionate analysis of this problem seems to suggest that people vandalise because there is an incentive to do so. This derives from the fact that in Nigeria government property belongs to nobody and therefore can be vandalised or stolen with impunity. However, the same societal institutional problem exists in the Russia Federation and African countries where electric lines fall prey to copper thieves' (Stigzer, 2000:21). These atrocities which are inimical to the functioning of the market are usually committed with impunity because the society's culture acquiesces in the vandalization and pillage of "government property", even though such behaviour adversely affects the services rendered to such society. This is a problem that requires an urgent state intervention. Closely related to this problem is energy theft as a lot of customers engaged in this act in form of illegal connection, by passing of metres.

Furthermore, while some distribution companies and generation companies have been privatised, gas supplies and facilities are monopolised by the government through the machineries of the NNPC. This is a major hindrance to efficient flow of gas to the gas-fired plants owing to the inefficiency associated with government monopoly.

The Way Forward

In order to achieve the lofty objectives of the power sector reforms in Nigeria, certain issues must be addressed. First, there is a need to increase the quantity of electricity generated in Nigeria. The more the quantity generated, the lower the tariff. Isola (2011) argued that if all the generators can produce up to 21,000MW using hydro only, price of hydro (Nkwh) will be

N2, 667. Similarly, if the entire generators can produce 33,000 MW, through gas, the price of Gas (Nkwh) will be N4.455. Under the present scenario, Nigeria generates less than 4,700MW with an average tariff of N20.00 under the proposed MYTO (2015) adjustment. Obviously, at the root of high tariff in Nigeria is low electricity generated. Therefore, attention should be paid to increasing the production of electricity in Nigeria.

Furthermore, there is the urgent need to ensure appropriate energy mix in the generation of electricity in Nigeria. Isola (2008) demonstrates that if all the generators can combine both hydro and gas in the process of production, a combined output of 284,808 WM of electricity would be generated at a price/tariff of N3.458. This study has demonstrated that a mixture of hydro and gas is more efficient than the use of a single technology in operation today in Nigeria. The crucial issue also is that neither Egbin, a thermal based plant, nor Shiroro, a hydro based station can independently operate profitably. This derives from the fact that with mixed technology, a firm has larger elbow to operate efficiently as substitution of hydro for gas and vice-versa in the process of production would be possible. During the wet season for instance, hydro stations can be employed cheaply than thermal (gas based), while the thermal can be used reasonably during the dry season to forestall the possibility of winding up operations or to reducing the scale of production. It is at this point that the new operators of the Shiroro Hydro Electric power plant, North-South Power Company's plan to build a new solar power plant with a capacity to generate 300MW of electricity be commended. All other power plant operators should take a cue from this bold initiative by exploring other avenues of generating electricity apart from solar to include wind, coal and biomas in the process of diversifying the source of generating electricity in Nigeria. Fortunately, Nigeria is well endowed with these resources as shown in Table 3.

Table 3: Transmission Company of Nigeria Major Equipment Age Distribution

		AGE DISTRIBUTION					
S/N	EQUIPMENTS	0-10YR	11-20YR	21-ABOVE	TOTAL EQUIPMENTS	0-20YR (%)	21-ABOVE (%)
1	330kV Trfmrs	5	1	32	38	16	84
2	132kV Trfmrs	48	48	148	244	32	61
3	330kV CBs	39	35	167	241	23	69
4	132Kv CBs	81	49	331	461	24	72
5	330kv TRX Lines	5	0	65	70	8	93
6	132kV TRX Lines	5	26	104	135	5	77
7	REACTORS	1	1	16	18	6	89

Source: **Labo, 2010**

In addition, the workability of the Multi-Year Tariff Order as a means of computing end-users tariff in Nigeria seems to be doubtful. This is obvious as observed in the last few months with series of litigations and mass protests over the recent increase tariff of the various discos in the country. Against the background of the need to diversify the sources of generating electricity in Nigeria, therefore, it is suggested that willingness to pay for good quality and uninterrupted supply of electricity among dwellers be conducted across the six geo-political zones in Nigeria. Apart from providing alternative methods for

estimating the electricity tariffs, it can be used as a reference point in estimating MYTO tariff. It is evidently a means to establish a workable electricity tariff plan in Nigeria.

As a way of mitigating the vandalising of the gas pipelines, it is suggested that the government should privatise the gas transmission networks in Nigeria by taking its cue from other countries like Australia and US where such facilities are in the hands of private individuals and communities.

Conclusion

The paper examines the challenges and suggests the way forward concerning power sector reforms in Nigeria. This is done to evaluate the first decade of the enactment of the law backing up the initiative. Essentially, the main thrust of the reforms is to ensure a system of generation, transmission, distribution and marketing that is efficient, safe affordable and cost effective throughout the industry. It appears that the realization of this lofty goal of transforming the sector has remained mixed owing to a number of challenges as highlighted in the subsequent paragraphs.

First, the issue of having a workable electricity tariffs under the Multi-Year Tariffs Order, in Nigeria has remained rather elusive. The recent amendment of the MYTO (2015) representing a 45 per cent hike in electricity tariff has generated a controversy between the government and stakeholders, leading to mass protests and court order litigations. Second, despite the private sector participation, the quantity of electricity generated in Nigeria is still very meagre coupled with the poor quality of service delivery. Electricity generation in Nigeria has been oscillating within the range of 1,700MW and 4,700MW since the inception of the power sector reforms in Nigeria.

Another challenge is the inappropriate energy mix in the generation of electricity in Nigeria. The country still relies on thermal fuel to generate electricity. However, the perennial problem of vandalisation of gas pipelines, with the attendant shortage of gas supply to generate electricity has made the need to diversify through solar, wind, biomass and coal germane. Besides the capacity challenges in the generation segment of the industry in Nigeria, the rest of the supply chain is in a state of mess. For instance, the transmission capacity to wheel electricity generated to the load centres is limited. Besides, most of the equipment are out-dated. The age distribution of the sector showed that almost 80 per cent of them were acquired over 20 years ago as shown in table 2 in the appendix. In addition, most of the discos also inherited dilapidated equipment.

The way forward lies in the need to increase the quantity of electricity generated in Nigeria. Besides, there is an urgent need to ensure appropriate energy mix in the generation of electricity. To support MYTO in establishing a workable electricity tariffs in Nigeria, it is suggested that a research on the willingness to pay for good quality and uninterrupted electricity supply among the consumers be conducted across the six geo-political zones in Nigeria. In order to ensure adequate supply of gas to the gas-fired plants across the country, there is the urgent need to fully implement the Gas Master Plan initiated in 2008. Additionally, in other to really motivate genuine investors, the investment climate must be made attractive. There is need for a conducive economic, social and political environment in the country since the sector cannot operate in a vacuum of its environment. Inputs of electricity production are tradable goods (gas and fuel), which are normally denominated in foreign currency, but the outputs are mostly sold within the country in local currency. The achievement of efficient supply of electricity at affordable tariffs, therefore, hinges on a

stable exchange rate. The social environment is still characterized by tension and frustration with frequent ethnic and religious crisis across the country. The Boko Haram in the Northeast Zone and frequent cases of kidnapping across the country are issues, which constitute wrong signals to genuine foreign investors in the power sector and must be tackled accordingly.

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